

IN THE CLAIMS

1-53 (Canceled)

54. (Currently Amended) A machine implemented method performed by a network element ~~having a first interface communicatively coupled to a first network and a second interface communicatively coupled to a second network~~, the method comprising:

receiving at a configuration manager of the network element a request from a user via

a command line interface (CLI) of the network element for configuring the

network element, the request including a transaction for accessing a

configuration file stored in one or more records of a database that is used to

route network traffic between the first network and the second network via the

first and second interfaces, the first network being different than the second

network configure operations of the network element, wherein the CLI is one of

a plurality of CLI interfaces provided by the network element to substantially

concurrently access the network element;

in response to the request, the configuration manager spawns a session thread to

associate the CLI with the configuration manager, wherein the associated

session thread is used by the CLI to communicate messages with the

configuration manager;

the configuration manager receiving from the CLI via the session thread one or more

CLI commands indicating one or more CLI operations of the transaction;

for each CLI operation, the configuration manager invoking a component manager
associated with a type of each CLI operation to process the CLI operations into
one or more database operations operable by the database being accessed;
~~in response to the request, recording database operations of the request in a transaction~~
~~log separated from the database without accessing the database until a commit~~
~~command is received from the user via the CLI of the network element; and~~
~~performing in response to a commit command from the CLI indicating that the user~~
has committed to the database operations, transmitting the recorded database
~~operations of the request from the transaction log to access a record of the~~
~~database associated with the request received from the user in response to a~~
~~commit command from the CLI indicating that the user has committed to the~~
~~requested configuration, wherein the recorded operations are performed within~~
the database in response to receiving the recorded database operations from the
transaction log.

55. (Previously Presented) The method of claim 54, wherein the transaction log comprises a persistent memory in which content of the transaction log is maintained after the network element is powered down or rebooted.

56. (Previously Presented) The method of claim 54, further comprising prior to recording the operations of the request in the transaction log, acquiring a lock for locking the record of the database associated with the request to prevent other users from accessing the record of the database.

57. (Previously Presented) The method of claim 56, further comprising:
receiving further modification of configuration from the user prior to the commit
command; and
storing the modification in the transaction log without accessing the data base until the
commit command is received from the user upon which the modification of the
configuration is committed from the transaction log to the locked record of
database.
58. (Currently Amended) The method of claim ~~56~~57, further comprising:
receiving an abort command from the user via the CLI prior to receiving the commit
command; and
in response to the abort command, removing the operations of the request from the
transaction log and releasing the acquired lock without accessing the database.
59. (Previously Presented) The method of claim 58, wherein after performing the
removing and releasing in response to the abort command, the record of the database remains
substantially identical with respect to the record prior to receiving the request.
60. (Previously Presented) The method of claim 56, further comprising indicating within
the transaction log that the request is in a committing state while committing the operations of
the request from the transaction log to the locked record of the database.
61. (Currently Amended) The method of claim ~~60~~54, further comprising ~~indicating within~~
~~the transaction log that the request is in a non-transaction state if operations of committing the~~

~~operations of the request from the transaction log to the database have completed.~~initializing the configuration manager during an initialization period of the network element, including the configuration manager registering with a process manager, the process manager managing processes performed by the component managers, the configuration manager initializing each of the component managers, each of the component managers registering with the process manager, the configuration manager storing identifiers (IDs) of the registered component managers in a table, wherein the component managers are subsequently invoked by the configuration manager based on the IDs of the component managers.

62. (Currently Amended) The method of claim 61, further comprising ~~indicating within the transaction log that the request is in a transaction state while recording the operations of the request in the transaction log before receiving the commit command from the user.~~configuration manager initially configuring the network element during the initialization period of the network by initiating an initialization transaction, including the process manager starting a configuration process by sending a message to the configuration manager requesting the initialization transaction, in response to the message, the configuration manager spawning a session thread for the configuration process, the configuration process requesting a transaction ID for the initialization transaction from the configuration manager and obtaining a lock on the database,

the configuration process reading configuration operations from a configuration file
and sending each of the configuration operations to the session thread using the
transaction ID while the database is locked,
after all of the configuration operations have been sent to the session thread, the
configuration process sending a commit command to the session thread for the
initialization transaction, and
the configuration process releasing the lock of the database, wherein the operations
sent to the session thread are performed within the database.

63. (Currently Amended) The method of claim 62~~54~~, further comprising:
in response to the session thread, the CLI sending a message to the configuration
manager indicating starting of a transaction;
the session thread requesting a transaction ID from the configuration manager;
the configuration manager returning the requested transaction ID to the CLI via the
session thread;
the configuration manager setting a state of the session thread to an in-transaction
state;
the CLI receiving a CLI operation from the user and performing a syntax verification
of the CLI operation;
the CLI sending a message having the CLI operation to the session thread including a
value identifying a component manager corresponding to the CLI operation.
~~detecting whether operations of committing the operations of the request from the~~
~~transaction log to the database have stopped resulted from errors of the~~
~~network element; and~~

~~in response to the detection, renewing performing the operations of the request from
the transaction log to the database while the record of the database is locked.~~

64. (Currently Amended) The method of claim 63, ~~wherein the detection of whether
operations of committing the operations of the request has stopped resulted from errors is
performed in response to the network element crashes and recovers from the crash.~~ further
comprising:

determining whether a CLI operation within the message includes one of a commit
command and an abort command;

if the CLI operation is not one of the commit and abort commands, the configuration
manager invoking the component manager identified by the message to process
the CLI operation;

the component manager performing semantic verification of the CLI operation and
rejecting the CLI operation if the CLI operation does not pass the semantic
verification;

if the CLI operation passes the semantic verification, the component manager
processing the CLI operation into one or more database operations to be
performed within the database.

65. (Currently Amended) The method of claim 64, ~~wherein the detection is performed by
examining within the transaction log whether the request is in the committing state, and
wherein the renewing is performed only if the request is in the committing state.~~ further
comprising:

the component manager determining whether a lock contention exists;

if the lock contention exists, the component manager notifying the configuration manager to block further CLI operations from the CLI;
in response to the notification, the configuration manager notifying the CLI regarding the lock contention;
the CLI prompting the user to either to wait or abort the CLI operation;
in response to an abort command received from the user, the component manager aborts the CLI operation.

66. (Currently Amended) The method of claim 6265, further comprising:
in response to a wait command received from the user, the component manager continuing blocking the CLI operation;
the component manager periodically checking whether the lock has been released;
if the lock has not been released, the component manager determining whether a period of time associated with the wait command has expired;
if the wait command has expired, prompting the user for further instructions including whether the user wants to wait or abort.
~~detecting whether operations of recording the operations of the request within the transaction log have stopped resulted from errors of the network element; and~~
~~in response to the detection, removing the request from the transaction log without committing to the database.~~

67. (Currently Amended) The method of claim 66, ~~wherein the detection of whether operations of recording the operations of the request within the transaction log has stopped~~

~~resulted from errors is performed in response to the network element crashes and recovers from the crash.~~further comprising:

if the CLI operation includes an abort command, the transaction corresponding to the abort command is aborted and the corresponding database operations are removed from the transaction log;

if the CLI operation includes a commit command, the corresponding session thread transitioning from the in-transaction state to an in-commit state;

marking the corresponding database operations in the transaction log as committed;

determining whether a network resource process for processing the CLI operation has died;

if the network resource process has not died, committing the corresponding database operations to the database via a backend procedure call;

changing the corresponding session thread from the in-commit state to a not-in-transaction state when the transaction is completed.

68. (Currently Amended) The method of claim 67, ~~wherein the detection is performed by examining within the transaction log whether the request is in the transaction state, and wherein the removing is performed only if the request is in the transaction state.~~further comprising:

if the network resource process has died, determining whether a current database operation is associated with the network resource process;

if the current database operation is not associated with the network resource process, performing database record request and invoking a backend procedure call;

if the current database operation is not associated with the network resource process,
performing database record request without invoking a backend procedure call.

69. (Previously Presented) The method of claim 56, further comprising:
determining whether the lock being acquired is unavailable;
notifying the user via the CLI that the lock is unavailable; and
prompting the user whether the user desires to wait or cancel the request.
70. (Previously Presented) The method of claim 59, further comprising:
removing the request from the transaction log in response to receiving a cancel
command from the user in response to the prompting; and
in response to receiving a wait command from the user, repeating acquiring the lock
until the lock has been acquired upon which if the commit command has been
received, the request is committed from the transaction log to the locked record
of the database.
71. (Currently Amended) A machine-readable medium having executable code to cause a
machine to perform a method of a network element ~~having a first interface communicatively
coupled to a first network and a second interface communicatively coupled to a second
network~~, the method comprising:
receiving at a configuration manager of the network element a request from a user via
a command line interface (CLI) of the network element for configuring the
network element, the request accessing ~~a configuration file stored~~ one or more
records of in a database that is used to ~~route network traffic between the first~~

~~network and the second network via the first and second interfaces, the first network being different than the second network~~ configure operations of the network element, wherein the CLI is one of a plurality of CLI interfaces provided by the network element to substantially concurrently access the network element;

in response to the request, the configuration manager spawns a session thread to associate the CLI with the configuration manager, wherein the associated session thread is used by the CLI to communicate messages with the configuration manager;

the configuration manager receiving from the CLI via the session thread one or more CLI commands indicating one or more CLI operations of the transaction;

for each CLI operation, the configuration manager invoking a component manager associated with a type of each CLI operation to process the CLI operations into one or more database operations operable by the database being accessed;

~~in response to the request, recording database operations of the request in a transaction log separated from the database without accessing the database until a commit command is received from the user via the CLI of the network element; and~~

in response to a commit command from the CLI indicating that the user has committed to the database operations, transmitting performing the recorded database operations of the request from the transaction log to access a record of the database associated with the request received from the user in response to a commit command from the CLI indicating that the user has committed to the requested configuration, wherein the recorded operations are performed within

the database in response to receiving the recorded database operations from the transaction log.

72. (Previously Presented) The machine-readable medium of claim 71, wherein the transaction log comprises a persistent memory in which content of the transaction log is maintained after the network element is powered down or rebooted.

73. (Previously Presented) The machine-readable medium of claim 71, wherein the method further comprises prior to recording the operations of the request in the transaction log, acquiring a lock for locking the record of the database associated with the request to prevent other users from accessing the record of the database.

74. (Previously Presented) The machine-readable medium of claim 73, wherein the method further comprises:

receiving further modification of configuration from the user prior to the commit command; and

storing the modification in the transaction log without accessing the data base until the commit command is received from the user upon which the modification of the configuration is committed from the transaction log to the locked record of database.

75. (Currently Amended) The machine-readable medium of claim ~~73~~74, wherein the method further comprises:

receiving an abort command from the user via the CLI prior to receiving the commit

command; and

in response to the abort command, removing the operations of the request from the transaction log and releasing the acquired lock without accessing the database.

76. (Previously Presented) The machine-readable medium of claim 75, wherein after performing the removing and releasing in response to the abort command, the record of the database remains substantially identical with respect to the record prior to receiving the request.

77. (Previously Presented) The machine-readable medium of claim 73, wherein the method further comprises indicating within the transaction log that the request is in a committing state while committing the operations of the request from the transaction log to the locked record of the database.

78. (Currently Amended) The machine-readable medium of claim ~~77~~71, wherein the method further comprises ~~indicating within the transaction log that the request is in a non-transaction state if operations of committing the operations of the request from the transaction log to the database have completed.~~ initializing the configuration manager during an initialization period of the network element, including

the configuration manager registering with a process manager, the process manager managing processes performed by the component managers,
the configuration manager initializing each of the component managers,
each of the component managers registering with the process manager,

the configuration manager storing identifiers (IDs) of the registered component managers in a table, wherein the component managers are subsequently invoked by the configuration manager based on the IDs of the component managers.

79. (Currently Amended) The machine-readable medium of claim 78, wherein the method further comprises ~~indicating within the transaction log that the request is in a transaction state while recording the operations of the request in the transaction log before receiving the commit command from the user.~~ configuration manager initially configuring the network element during the initialization period of the network by initiating an initialization transaction, including

the process manager starting a configuration process by sending a message to the configuration manager requesting the initialization transaction,

in response to the message, the configuration manager spawning a session thread for the configuration process,

the configuration process requesting a transaction ID for the initialization transaction from the configuration manager and obtaining a lock on the database,

the configuration process reading configuration operations from a configuration file and sending each of the configuration operations to the session thread using the transaction ID while the database is locked,

after all of the configuration operations have been sent to the session thread, the configuration process sending a commit command to the session thread for the initialization transaction, and

the configuration process releasing the lock of the database, wherein the operations sent to the session thread are performed within the database.

80. (Currently Amended) The machine-readable medium of claim 7971, wherein the method further comprises:

in response to the session thread, the CLI sending a message to the configuration manager indicating starting of a transaction;

the session thread requesting a transaction ID from the configuration manager;

the configuration manager returning the requested transaction ID to the CLI via the session thread;

the configuration manager setting a state of the session thread to an in-transaction state;

the CLI receiving a CLI operation from the user and performing a syntax verification of the CLI operation;

the CLI sending a message having the CLI operation to the session thread including a value identifying a component manager corresponding to the CLI operation.

~~detecting whether operations of committing the operations of the request from the transaction log to the database have stopped resulted from errors of the network element; and~~

~~in response to the detection, renewing performing the operations of the request from the transaction log to the database while the record of the database is locked.~~

81. (Currently Amended) The machine-readable medium of claim 80, wherein the ~~detection of whether operations of committing the operations of the request has stopped~~

~~resulted from errors is performed in response to the network element crashes and recovers from the crash.~~the method further comprises:

determining whether a CLI operation within the message includes one of a commit command and an abort command;

if the CLI operation is not one of the commit and abort commands, the configuration manager invoking the component manager identified by the message to process the CLI operation;

the component manager performing semantic verification of the CLI operation and rejecting the CLI operation if the CLI operation does not pass the semantic verification;

if the CLI operation passes the semantic verification, the component manager processing the CLI operation into one or more database operations to be performed within the database.

82. (Currently Amended) The machine-readable medium of claim 81, wherein ~~the detection is performed by examining within the transaction log whether the request is in the committing state, and wherein the renewing is performed only if the request is in the committing state.~~the method further comprises:

the component manager determining whether a lock contention exists;

if the lock contention exists, the component manager notifying the configuration manager to block further CLI operations from the CLI;

in response to the notification, the configuration manager notifying the CLI regarding the lock contention;

the CLI prompting the user to either to wait or abort the CLI operation;

in response to an abort command received from the user, the component manager
aborts the CLI operation.

83. (Currently Amended) The machine-readable medium of claim 7982, wherein the method further comprises:

in response to a wait command received from the user, the component manager
continuing blocking the CLI operation;

the component manager periodically checking whether the lock has been released;

if the lock has not been released, the component manager determining whether a
period of time associated with the wait command has expired;

if the wait command has expired, prompting the user for further instructions including
whether the user wants to wait or abort.

~~detecting whether operations of recording the operations of the request within the~~
~~transaction log have stopped resulted from errors of the network element; and~~
~~in response to the detection, removing the request from the transaction log without~~
~~committing to the database.~~

84. (Currently Amended) The machine-readable medium of claim 83, wherein ~~the~~
~~detection of whether operations of recording the operations of the request within the~~
~~transaction log has stopped resulted from errors is performed in response to the network~~
~~element crashes and recovers from the crash.~~ the method further comprises:

if the CLI operation includes an abort command, the transaction corresponding to the
abort command is aborted and the corresponding database operations are
removed from the transaction log;

if the CLI operation includes a commit command, the corresponding session thread
transitioning from the in-transaction state to an in-commit state;
marking the corresponding database operations in the transaction log as committed;
determining whether a network resource process for processing the CLI operation has
died;
if the network resource process has not died, committing the corresponding database
operations to the database via a backend procedure call;
changing the corresponding session thread from the in-commit state to a not-in-
transaction state when the transaction is completed.

85. (Currently Amended) The machine-readable medium of claim 84, wherein ~~the~~
~~detection is performed by examining within the transaction log whether the request is in the~~
~~transaction state, and wherein the removing is performed only if the request is in the~~
~~transaction state.~~ the method further comprises:

if the network resource process has died, determining whether a current database
operation is associated with the network resource process;
if the current database operation is not associated with the network resource process,
performing database record request and invoking a backend procedure call;
if the current database operation is not associated with the network resource process,
performing database record request without invoking a backend procedure call.

86. (Previously Presented) The machine-readable medium of claim 83, wherein the
method further comprises:

determining whether the lock being acquired is unavailable;

notifying the user via the CLI that the lock is unavailable; and
prompting the user whether the user desires to wait or cancel the request.

87. (Previously Presented) The machine-readable medium of claim 86, wherein the method further comprises:

removing the request from the transaction log in response to receiving a cancel
command from the user in response to the prompting; and
in response to receiving a wait command from the user, repeating acquiring the lock
until the lock has been acquired upon which if the commit command has been
received, the request is committed from the transaction log to the locked record
of the database.

88. (Canceled)